I/WE CLAIM:

1. A transmitter for an optical network unit (ONU) adapted to transmit data over a return data channel of a passive optical network in accordance with a predefined time-sharing protocol, the transmitter comprising:

a laser driver for driving a laser of the transmitter to generate an optical carrier;

a modulation sub-system for modulating data onto the optical carrier generated by the laser; and

a secondary modulation sub-system for impressing an ONU identifier onto the optical carrier, the ONU identifier serving to identify the ONU to a network monitor that monitors the return data channel.

2. The transmitter as claimed in claim 1 wherein the secondary modulation sub-system comprises:

a tone source for supplying a tone that serves as the ONU identifier to a tone modulator adapted to modulate the ONU identifier onto the optical carrier.

3. The transmitter as claimed in claim 2 wherein the tone has a frequency that is well below a data modulation frequency of the primary modulation subsystem.

4. The transmitter as claimed in claim 2 wherein the tone has a frequency that is well above a data

modulation frequency of the primary modulation subsystem.

5. The transmitter as claimed in claim 1 wherein the secondary modulation sub-system comprises:

an ONU identifier source for supplying the ONU identifier to the modulation sub-system to permit the ONU identifier to be modulated onto the optical carrier by the secondary modulation sub-system.

6. The transmitter as claimed in claim 2 further comprising a switch for selectively switching the tone to the tone modulator so that the tone modulator does not impress the ONU identifier onto the optical carrier during a timeslot allocated to the ONU.

7. The transmitter as claimed in claim 6 further comprising a latching circuit adapted to receive timeslot information indicating a timeslot allocated to the ONU, the latching circuit being further adapted to toggle the switch to switch the tone to the secondary modulation sub-system at respective boundaries of the timeslot.

8. A system for detecting a fail state in an optical network unit (ONU) of a passive optical network (PON) that includes a plurality of ONUs connected to an optical line terminal (OLT), the system comprising:

a secondary modulation sub-system in each ONU for impressing an ONU identifier onto an optical carrier generated by the respective ONU; and

a network monitor for monitoring a time-shared return data channel of the PON, the network monitor being adapted to detect the ONU identifier impressed on the optical carrier, and further adapted to identify the ONU that impressed the ONU identifier on the optical carrier.

9. The system as claimed in claim 8 wherein the secondary modulation sub-system is adapted to impress the ONU identifier on the optical carrier only when a laser of the ONU is transmitting outside of its timeslot.

10. The system as claimed in claim 8 wherein the secondary modulation sub-system is adapted to impress the ONU identifier on the optical carrier whenever the laser of the ONU is transmitting.

11. The system as claimed in claim 9 wherein the secondary modulation sub-system further comprises means for switching the secondary modulation sub-system on and off at boundaries of the ONU's timeslots.

12. The system as claimed in claim 6 wherein the network monitor comprises:

an optical tap for tapping a small proportion of light from the time-shared return data channel;

an optical detector for converting the tapped light to an electrical signal;

an amplifier for amplifying the electrical signal;

a band pass filter for removing unwanted components from the electrical signal; and

a demodulation and tone detection circuit for processing the digital signal to identify any ONU that impressed an ONU identifier on the return data channel.

13. The system as claimed in claim 8 wherein the network monitor is further adapted to send a service message to the identified ONU to shut down the ONU if the ONU has entered an on-state failure mode.

14. The system as claimed in claim 13 wherein the network monitor is further adapted to send a service request to a service dispatch system, which advises the service dispatch system of the status of the identified ONU.

15. A method for enabling remote transmission fault detection at an optical transmitter for an optical network unit (ONU), the method comprising:

provisioning the transmitter with an ONU identifier; and

impressing the ONU identifier on an optical carrier generated by a laser of the ONU using a secondary modulation of the optical carrier, so that a network monitor can identify the source of the transmission by isolating the ONU identifier impressed on the optical carrier.

16. The method as claimed in claim 15 further comprising:

receiving timeslot information defining discrete time slots allocated to the ONU, and

impressing the ONU identifier on the optical carrier during periods between the timeslots allocated in the ONU.

17. The method as claimed in claim 16 wherein impressing the ONU identifier on the optical carrier comprises supplying a tone for identifying the ONU to a tone modulator that impresses the ONU identifier as an amplitude dither on the optical carrier generated by the laser.

18. The method as claimed in claim 15 further comprising monitoring the optical carrier at a network monitor to determine when an ONU identifier is impressed on the optical carrier.

19. The method as claimed in claim 18 further comprising sending a service message from the network monitor to the ONU, the service message being intended to shut down the ONU when the ONU is determined to be stuck in a failure mode.

20. The method as claimed in claim 19 further comprising sending a service request message from the network monitor to a service dispatch system, to prompt the service dispatch system to send service personnel to the identified ONU.

21. An ONU identifier impressed on an optical carrier transmitted by an optical network unit (ONU), the ONU identifier identifying the ONU to a monitoring apparatus so that if a laser of the ONU is on at any time other than one or more timeslots allocated to the ONU, the monitoring apparatus can identify the

ONU by isolating the ONU identifier impressed on the optical carrier.

22. The ONU identifier as claimed in claim 19, wherein the ONU identifier is impressed on the optical carrier only at time other than during the one or more allocated timeslots.

23. The ONU identifier as claimed in claim 21 wherein the ONU identifier comprises one or more words impressed on the optical carrier.

24. The ONU identifier as claimed in claim 23 wherein the ONU identifier carries management information from the ONU to an optical terminal unit (OLT).